NISTIR 6146

Nuisance Alarms in Aircraft Cargo Areas and Critical Telecommunications Systems: Proceedings of The Third NIST Fire Detector Workshop

William L. Grosshandler
Editor

Building and Fire Research Laboratory
Gaithersburg, Maryland 20899

United States Department of Commerce
Technology Administration
National Institute of Standards and Technology

NISTIR 6146

Nuisance Alarms in Aircraft Cargo Areas and Critical Telecommunications Systems: Proceedings of The Third NIST Fire Detector Workshop

William L.Grosshandler
Editor

March 1998
Building and Fire Research Laboratory
National Institute of Standards and Technology
Gaithersburg, MD 20899

U.S. Department of Commerce
William M. Daley, *Secretary*
Technology Administration
Gary R. Bachula, *Acting Under Secretary for Technology*
National Institute of Standards and Technology
Raymond G. Kammer, *Director*

Grosshandler, W. L.

NUISANCE ALARMS IN AIRCRAFT CARGO AREAS AND CRITICAL TELECOMMUNICATION SYSTEMS

INTRODUCTION

The Building and Fire Research Laboratory at NIST held the third in a series of workshops on the topic of fire detection in December, 1997 in Gaithersburg, Maryland. The previous workshop, held in February of 1995, had a number of objectives: to identify the needs of users and specifiers of fire detection systems which were not being met; to highlight future needs which could result from new developments in the construction, transportation, and manufacturing sectors, or from regulatory changes; to identify generic technological barriers which were limiting the fire protection industry from fully meeting the users' needs; and to develop a research agenda and recommend priorities to enable U.S. industry to overcome these technological barriers. The proceedings from that workshop are available in a NIST Internal Report[1].

Research has been ongoing and new detection systems have come onto the market which address some of the concerns brought out in 1995. However, the need for faster and more intelligent decision making regarding the presence or absence of a fire threat has become more acute in a number of critical applications. Fire detection in commercial aircraft and in the telecommunications industry are two such applications, and these have been particularly hard-hit by the cessation of halon production.

Combination multi-sensor detectors, miniature solid-state gas sensors, fiber optics, multiple species infrared sensing, trained neural networks, machine vision, and sophisticated signal processing methods were mentioned at the last workshop, and most are still actively being pursued in the laboratory. The performance of these and other new technologies need to be evaluated against a realistic fire scenario, for which a number of generally accepted standards exist. As important as the detection system's ability to sense an actual fire is its ability to not be fooled by a non-fire stimulus. Although limited field data exist on the causes of false alarms in certain applications, and although manufacturers, users and researchers each have their own ideas about what might trigger a nuisance alarm, there are no accepted standards against which a fire detection system can be operated to assess its immunity to false alarm. The third NIST workshop examined this issue. Its main objective was to identify physical sources of nuisance alarms that may plague current and emerging fire detection technologies for telecommunications applications and for aircraft cargo areas, to reach consensus on what test methods are appropriate to evaluate a detection system's immunity to false alarm in the presence of physical nuisance sources, and to recommend actions to develop and/or implement these new test methods.

The following questions were posed to the participants:

1. What fire detection systems are currently being used in the telecommunications and commercial aircraft industries?

2. What are the industries' definitions of a "false" or "nuisance" alarm, and what are the primary sources?

3. Are new, low-false-alarm technologies emerging that are practical for use in telecommunication facilities and aboard aircraft?

4. What physical environmental conditions (e.g., temperature, pressure, moisture, particulate levels, air flows, gas concentrations) are most likely to be confused with the early stages of a fire on board an airplane or in a telecommunications facility?

5. What activities or events are most likely to generate these conditions (e.g., maintenance, cleaning, normal heating and cooling, rain, human presence, operation of adjacent equipment)?

6. Can a consensus be reached on what new metrics need to be developed, and on what the roles are for the different parties in developing them (manufacturers, users, UL, FM, NIST, NFPA, FAA, NASA)?

The workshop consisted of a number of invited background talks from representatives of the aircraft and telecommunications industries and government agencies. (The agenda with names of speakers is listed in Appendix B. The list of attendees with their affiliations is attached as Appendix D.) The current state of detector evaluation methodologies was reviewed, along with what has been documented in the open literature regarding the number and sources of nuisance/false alarms in these two applications. Groups were formed from among the participants, as listed in Appendix C, that attempted to answer questions 4, 5 and 6 as they applied to either the aircraft or the telecommunications industry. On the second day, a representative from each group summarized the discussion from the breakout session and proposed answers to the rest of the workshop participants. Open deliberations then followed in an attempt to arrive at a consensus.

This report describes the activities of the workshop and summarizes the key findings. Background on fire detection problems in critical telecommunications facilities and in aircraft cargo areas are presented in the following sections. Recommendations for future actions are included next. Current methods for evaluating general fire detection systems exposed to nuisance and actual fire sources are reviewed in Appendix A.